ATTACHMENT 2

EMISSIONS CALCULATIONS

1. Overview

The South Coast Air Quality Management District (AQMD) is responsible for clean air in the South Coast Air Basin (SCAB or Basin), an area that includes Orange County and the non-desert portions of Los Angeles, Riverside and San Bernardino counties. South Coast Air Basin is designated as a non-attainment area for Ozone and Particulate Matter (PM). As such, the most significant air quality challenge in the Basin is to reduce nitrogen oxide (NOx) emissions sufficiently to meet the upcoming ozone standard deadline. Based on the inventory and modeling performed during development of 2016 Air Quality Management Plan (AQMP), 45% and 55% NOx emissions reductions are needed by 2023 and 2031 to meet this deadline. Mobile sources contribute to 80% of NOx emissions inventory. Therefore, the proposed project can provide surplus emissions reductions considering other State and Federal requirements target dates for transitioning to zero emissions vehicles.

This proposed project is to deliver and deploy 38 zero emission battery electric buses (BEB), to replace 38 ULSD powered buses currently operating in the Moreno Valley school district. These emissions reductions accelerate attainment goals as several zero emissions vehicles regulations are not implemented till late 2025. The proposed project replaces buses which are mostly older than 14 years which is typical for EJ community school districts. .

Emissions reductions are calculated using the EPA Diesel Emissions Quantifier calculated for a fleet of 38 2007 model-year diesel powered buses. (see Emissions Inventory Attachment). For these calculations. it is assumed that zero emission buses will have the same energy requirements as their diesel baseline counterparts and will travel the same duty cycle (same average number of miles per year). The emissions reductions are calculated on an annual basis and for the full equipment lifetime.

2. Advanced Technology Fleet Description

- 38zero-emission New Flyer 40’ XE battery electric buses
    - Moreno Valley has been upgrading the infrastructure in anticipation of receiving battery electric bus technology.

3. Criteria Pollutant Emissions Reductions

3.1 Calculations

Using the EPA diesel Emissions quantifier:

4. Emission Results

Target Fleet School Bus

Quantity 38, **Engine Model Year** 2005, **Upgrade Year** 2022, **Remaining Life** 25, **Fuel Type** ULSD (diesel), **Annual Fuel Gallons** 1,360, **Diesel-equivalent Gallons** 1,360, **Annual Miles Traveled** 14,084, **Annual Idling Hours** 107

Annual Results (short tons)[2]	**NO_x**	**PM2.5**	**HC**	**CO**	**CO_2**	**Fuel**[3]
Baseline for Upgraded Vehicles/Engines	3.675	0.301	0.494	1.823	581.4	51,680
Amount Reduced After Upgrades	3.675	0.301	0.494	1.823	581.4	51,680
Percent Reduced After Upgrades	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Lifetime Results (short tons)[2]						
Baseline for Upgraded Vehicles/Engines	91.866	7.534	12.360	45.575	14,535.0	1,292,000
Amount Reduced After Upgrades	91.866	7.534	12.360	45.575	14,535.0	1,292,000
Percent Reduced After Upgrades	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Lifetime Cost Effectiveness ($/short ton reduced)						
Capital Cost Effectiveness[4] (unit & labor costs only)	$124,094	$1,513,094	$922,367	$250,135	$784	

Annual Results (short tons)[2]	NO_x	PM2.5	HC	CO	CO_2	Fuel[3]
Total Cost Effectiveness[4] (includes all project costs)	$97,969	$1,194,548	$728,184	$197,475	$619	

[1] Emissions from the electrical grid are not included in the results.
[2] 1 short ton = 2000 lbs.
[3] In gallons; fuels other than ULSD have been converted to ULSD-equivalent gallons.
[4] Cost effectiveness estimates include only the costs which you have entered.

5. Remaining Life

Vehicle or Engine Group	Remaining Life
Moreno: School Bus Vehicle Replacement - All-Electric	25 years

Annual emissions for the baseline case, 38 diesel powered buses are shown in the table below. The annual emissions for the baseline case were calculated in. battery electric buses zero emission at the tailpipe and thus all their associated emissions are shown as 0 tons/yr.

5.1 Health Benefits of reduced emissions

5.2 Results

The table below shows the estimated PM2.5 reductions and health benefits by county and as a total for your project. Results are based on the inputs you have entered.

Annual Benefits represent the dollar value of health benefits resulting from reduced exposure to PM2.5. These benefits include the reduction of premature mortality, chronic bronchitis, asthma attacks, non-fatal heart attacks, and other health problems. The dollar values are based on studies used by EPA when estimating the health benefits of environmental rules.

Annualized Costs are based on the unit and labor costs you have entered. They have been annualized over the remaining life of the upgraded project.

Health Benefits Results

County and State	Annual Diesel PM2.5 Reduction (short tons)	Annual Benefits	Annualized Unit & Labor Costs
Riverside, California	0.301	$370,000	-
Total	0.301	$370,000	$650,000